

TEST RESULT SUMMARY

FCC Part 15 Subpart D IC RSS-213 Issue 2

MANUFACTURER	Revolabs Inc
NAME OF EQUIPMENT	Solo Wireless Microphone Base Station
MODEL NUMBERS	01-EXERAC-BLK-11
MANUFACTURER'S ADDRESS	63 Great Road Maynard, MA 01754
TEST REPORT NUMBER	DI602355.1
TEST DATES	05 May-16 June 2006

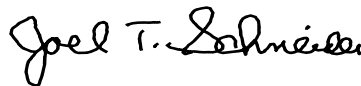
According to testing performed at TÜV America Inc and TRL, the above-mentioned system is in compliance with the applicable electromagnetic compatibility (EMC) portions of the requirements defined in FCC Parts 15 Subpart D and Industry Canada RSS-213 Issue 2.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable EMC requirements of FCC Part 15 Subpart D "Unlicensed Personal Communications Service Devices" and Industry Canada RSS-213 Issue 2 "2 GHz Licence-exempt Personal Communications Service Devices (LE-PCS)".

Date: 21 June 2006

Location: Taylors Falls MN
USA



J. T. Schneider
Senior Engineer



G. S. Jakubowski
Test Engineer

Not Transferable

EMC Emission - TEST REPORT

Test Report File No. : **DI602355.1** Date of issue: 21 June 2006

Model Nos. : **01-EXERAC-BLK-11**

Product Name : **Sole Wireless Microphone Base Station**

Product Type : **Transmitter operating in 1920-1930 MHz band**

Applicant : **Revolabs Inc.**

Manufacturer : **Revolabs Inc.**

License Holder : **Revolabs Inc.**

Address : **63 Great Road
Maynard, MA 01754**

Test Result : ☒ **Positive** ☐ **Negative**

Test Project Number
Reference(s) : **DI602355.1**

Total pages including Appendices : **36**

TÜV America Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV America Inc issued reports.

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*TÜV America Inc and its professional staff hold government
and professional organization certifications and are members of
AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI*

D I R E C T O R Y

Documentation

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Test Results

	FCC	IC RSS-213	
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Appendix A

Constructional data form	<u>A1 - A7</u>
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Appendix B

Measurement Protocol	<u>B1 - B2</u>
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Sign Explanations:

- ☐ - not applicable
- ☒ - applicable

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|---|---|------------------------------------|
| ☐ - EN 50081-1 / 1991 | ☐ - Group 1 | ☐ - Group 2 |
| ☐ - EN 55011 / 1991 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55013 / 1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1987 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55014 / A2:1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1993 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55015 / 1987 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55015 / A1:1990 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55015 / 1993 | | |
| ☐ - EN 55022 / 1987 | | |
| ☐ - EN 55022 / 1991 | | |
| ☐ - BS | ☐ - Class A | ☐ - Class B |
| ☐ - VCCI | ☐ - Class A | ☐ - Class B |
| ☐ - FCC Part 15 Subpart B | ☐ - Class A | ☐ - Class B |
| ☒ - FCC Part 15 Subpart D | | |
| ☐ - FCC Part 24 | | |
| ☐ - FCC Part 22 | | |
| ☐ - CISPR 11 (1990) | ☐ - Group 1 | ☐ - Group 2 |
| | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 22 (1993) | ☐ - Class A | ☐ - Class B |
| ☐ - IC RSS-Gen Issue 1 | | |
| ☐ - IC RSS-193 Issue 1 | | |
| ☒ - IC RSS-213 Issue 2 | | |

Subpart B requirements for system: FCC 15.309(b)

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Minimum margin of compliance for radiated emissions is >10 dB for the base station in non-transmit mode.

Test location

- ☒ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)

Test Distance

- ☒ - 3 meters
☐ - 10 meters
☐ - Conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3204	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	19-Oct-06
2679	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00550	23-Nov-06
8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	28-Mar-07
8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	28-Mar-07
2670	8447D	Electro-Mechanics (EMCO)	Preamplifier	2443A03954	04/12/2007-B

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment

Test limit

FCC Part 15 Subpart B

EUT Description: WIRELESS MICROPHONE BASE STATION

Data File Name: 2355.dat	Page: 1 of 1
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Signature

Conducted limits: FCC 15.315, IC RSS-213 6.3

Test summary

The requirements are: ■ - MET □ - NOT MET

Minimum margin of compliance for conducted emissions is 4 dB at 1.8 MHz for the Solo base station.

Test location

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☒ - Wild River Lab Shield Room

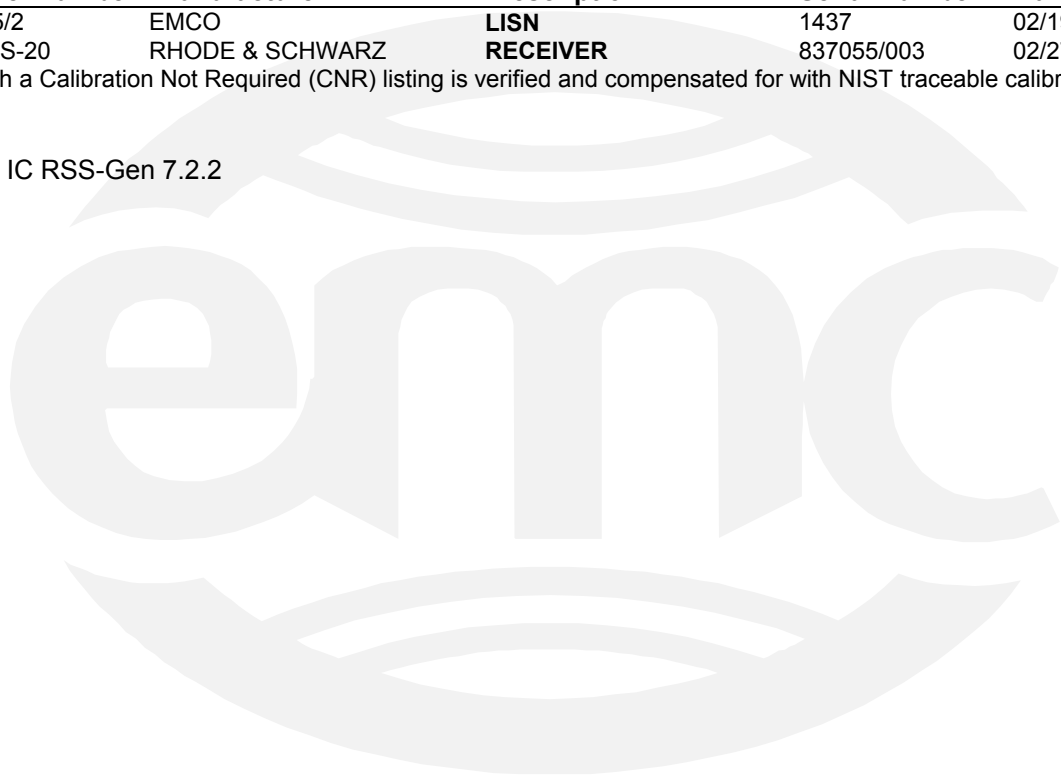
Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
2416	3825/2	EMCO	LISN	1437	02/19/2007-B
2534	ESHS-20	RHODE & SCHWARZ	RECEIVER	837055/003	02/27/2007

Equipment with a Calibration Not Required (CNR) listing is verified and compensated for with NIST traceable calibrated equipment.

Test limit

FCC 15.207, IC RSS-Gen 7.2.2



CONDUCTED EMISSIONS



Test Report #: DI602355 Run 4

Test Area: SCREENROOM

EUT Model #: SOLO EXECUTIVE

Date: 5/25/2006

EUT Serial #: _____

EUT Power: 60Hz/120VAC

Temperature: 23.0 °C

Test Method: FCC 15 SUBPART D

Air Pressure: 99.0 kPa

Customer: REVOLABS Rel. Humidity: 40.0 %

EUT Description: WIRELESS MICROPHONE BASE STATION

Notes: _____

Data File Name: 2355.dat Page: 1 of 5

List of measurements for run #: 4

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp	DELTA2 EN55022 B Avg
150.0 kHz	48.73 Qp	0.07 / 0.3 / 0.0 / 0.0	49.1	L1	-16.9	n/a
200.0 kHz	48.17 Qp	0.1 / 0.17 / 0.0 / 0.0	48.44	L1	-15.17	n/a
270.0 kHz	45.29 Qp	0.1 / 0.1 / 0.0 / 0.0	45.49	L1	-15.62	n/a
334.0 kHz	49.02 Qp	0.11 / 0.1 / 0.0 / 0.0	49.23	L1	-10.12	n/a
726.0 kHz	41.11 Qp	0.13 / 0.1 / 0.0 / 0.0	41.34	L1	-14.66	n/a
792.84 kHz	41.33 Qp	0.13 / 0.1 / 0.0 / 0.0	41.56	L1	-14.44	n/a
1.32 MHz	41.35 Qp	0.16 / 0.0 / 0.0 / 0.0	41.51	L1	-14.49	n/a
1.85 MHz	41.94 Qp	0.19 / 0.0 / 0.0 / 0.0	42.13	L1	-13.87	n/a
2.18 MHz	42.83 Qp	0.21 / 0.0 / 0.0 / 0.0	43.04	L1	-12.96	n/a
3.04 MHz	35.56 Qp	0.23 / 0.0 / 0.0 / 0.0	35.79	L1	-20.21	n/a
4.03 MHz	34.1 Qp	0.27 / 0.0 / 0.0 / 0.0	34.37	L1	-21.63	n/a
7.99 MHz	33.37 Qp	0.36 / 0.04 / 0.0 / 0.0	33.77	L1	-26.23	n/a
9.25 MHz	41.13 Qp	0.39 / 0.14 / 0.0 / 0.0	41.66	L1	-18.34	n/a
12.09 MHz	38.14 Qp	0.44 / 0.22 / 0.0 / 0.0	38.8	L1	-21.2	n/a
20.81 MHz	30.98 Qp	0.58 / 0.36 / 0.0 / 0.0	31.93	L1	-28.07	n/a
24.35 MHz	26.78 Qp	0.62 / 0.65 / 0.0 / 0.0	28.05	L1	-31.95	n/a
150.0 kHz	16.79 Av	0.07 / 0.3 / 0.0 / 0.0	17.16	L1	n/a	-38.84
200.0 kHz	32.53 Av	0.1 / 0.17 / 0.0 / 0.0	32.8	L1	n/a	-20.81
270.0 kHz	24.18 Av	0.1 / 0.1 / 0.0 / 0.0	24.38	L1	n/a	-26.73
334.0 kHz	39.57 Av	0.11 / 0.1 / 0.0 / 0.0	39.78	L1	n/a	-9.57
726.0 kHz	39.15 Av	0.13 / 0.1 / 0.0 / 0.0	39.38	L1	n/a	-6.62
792.84 kHz	39.73 Av	0.13 / 0.1 / 0.0 / 0.0	39.96	L1	n/a	-6.04
1.32 MHz	40.59 Av	0.16 / 0.0 / 0.0 / 0.0	40.75	L1	n/a	-5.25
1.85 MHz	40.52 Av	0.19 / 0.0 / 0.0 / 0.0	40.71	L1	n/a	-5.29
2.18 MHz	40.68 Av	0.21 / 0.0 / 0.0 / 0.0	40.89	L1	n/a	-5.11
3.04 MHz	33.09 Av	0.23 / 0.0 / 0.0 / 0.0	33.32	L1	n/a	-12.68
4.03 MHz	32.35 Av	0.27 / 0.0 / 0.0 / 0.0	32.62	L1	n/a	-13.38

Tested by: J. T. Schneider

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Joel T. Schneider

Signature

Reviewed by: Greg Jakubowski

Printed

G Jakubowski

Signature

CONDUCTED EMISSIONS



Test Report #: DI602355 Run 4 Test Area: SCREENROOM

EUT Model #: SOLO EXECUTIVE Date: 5/25/2006

EUT Serial #: _____ EUT Power: 60Hz/120VAC Temperature: 23.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 99.0 kPa

Customer: REVOLABS Rel. Humidity: 40.0 %

EUT Description: WIRELESS MICROPHONE BASE STATION

Notes: _____

Data File Name: 2355.dat

Page: 2 of 5

List of measurements for run #: 4

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp	DELTA2 EN55022 B Avg
7.99 MHz	28.31 Av	0.36 / 0.04 / 0.0 / 0.0	28.71	L1	n/a	-21.29
9.25 MHz	38.52 Av	0.39 / 0.14 / 0.0 / 0.0	39.05	L1	n/a	-10.95
12.09 MHz	36.45 Av	0.44 / 0.22 / 0.0 / 0.0	37.11	L1	n/a	-12.89
20.81 MHz	26.3 Av	0.58 / 0.36 / 0.0 / 0.0	27.25	L1	n/a	-22.75
24.35 MHz	20.27 Av	0.62 / 0.65 / 0.0 / 0.0	21.54	L1	n/a	-28.46
1.85 MHz	42.55 Qp	0.19 / 0.0 / 0.0 / 0.0	42.74	N	-13.26	n/a
1.85 MHz	40.85 Av	0.19 / 0.0 / 0.0 / 0.0	41.04	N	n/a	-4.96
2.18 MHz	43.12 Qp	0.21 / 0.0 / 0.0 / 0.0	43.33	N	-12.67	n/a
2.18 MHz	40.34 Av	0.21 / 0.0 / 0.0 / 0.0	40.55	N	n/a	-5.45
3.04 MHz	36.89 Qp	0.23 / 0.0 / 0.0 / 0.0	37.12	N	-18.88	n/a
3.04 MHz	32.22 Av	0.23 / 0.0 / 0.0 / 0.0	32.45	N	n/a	-13.55
7.99 MHz	34.93 Qp	0.36 / 0.04 / 0.0 / 0.0	35.33	N	-24.67	n/a
7.99 MHz	30.18 Av	0.36 / 0.04 / 0.0 / 0.0	30.58	N	n/a	-19.42
9.25 MHz	42.11 Qp	0.39 / 0.14 / 0.0 / 0.0	42.64	N	-17.36	n/a
9.25 MHz	39.53 Av	0.39 / 0.14 / 0.0 / 0.0	40.06	N	n/a	-9.94

Tested by: J. T. Schneider

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Reviewed by: Greg Jakubowski

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CONDUCTED EMISSIONS



Test Report #: DI602355 Run 4 Test Area: SCREENROOM

EUT Model #: SOLO EXECUTIVE Date: 5/25/2006

EUT Serial #: _____ EUT Power: 60Hz/120VAC Temperature: 23.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 99.0 kPa

Customer: REVOLABS Rel. Humidity: 40.0 %

EUT Description: WIRELESS MICROPHONE BASE STATION

Notes: _____

Data File Name: 2355.dat

Page: 3 of 5

Measurement summary for limit1: EN55022 B Qp (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp
334.0 kHz	49.02 Qp	0.11 / 0.1 / 0.0 / 0.0	49.23	L1	-10.12
2.18 MHz	43.12 Qp	0.21 / 0.0 / 0.0 / 0.0	43.33	N	-12.67
1.85 MHz	42.55 Qp	0.19 / 0.0 / 0.0 / 0.0	42.74	N	-13.26
792.84 kHz	41.33 Qp	0.13 / 0.1 / 0.0 / 0.0	41.56	L1	-14.44
1.32 MHz	41.35 Qp	0.16 / 0.0 / 0.0 / 0.0	41.51	L1	-14.49
726.0 kHz	41.11 Qp	0.13 / 0.1 / 0.0 / 0.0	41.34	L1	-14.66
200.0 kHz	48.17 Qp	0.1 / 0.17 / 0.0 / 0.0	48.44	L1	-15.17
270.0 kHz	45.29 Qp	0.1 / 0.1 / 0.0 / 0.0	45.49	L1	-15.62
150.0 kHz	48.73 Qp	0.07 / 0.3 / 0.0 / 0.0	49.1	L1	-16.9
9.25 MHz	42.11 Qp	0.39 / 0.14 / 0.0 / 0.0	42.64	N	-17.36
3.04 MHz	36.89 Qp	0.23 / 0.0 / 0.0 / 0.0	37.12	N	-18.88
12.09 MHz	38.14 Qp	0.44 / 0.22 / 0.0 / 0.0	38.8	L1	-21.2
4.03 MHz	34.1 Qp	0.27 / 0.0 / 0.0 / 0.0	34.37	L1	-21.63
7.99 MHz	34.93 Qp	0.36 / 0.04 / 0.0 / 0.0	35.33	N	-24.67
20.81 MHz	30.98 Qp	0.58 / 0.36 / 0.0 / 0.0	31.93	L1	-28.07
24.35 MHz	26.78 Qp	0.62 / 0.65 / 0.0 / 0.0	28.05	L1	-31.95

Tested by: J. T. Schneider

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Signature

Reviewed by: Greg Jakubowski

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Signature

CONDUCTED EMISSIONS



Test Report #: DI602355 Run 4 Test Area: SCREENROOM

EUT Model #: SOLO EXECUTIVE Date: 5/25/2006

EUT Serial #: _____ EUT Power: 60Hz/120VAC Temperature: 23.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 99.0 kPa

Customer: REVOLABS Rel. Humidity: 40.0 %

EUT Description: WIRELESS MICROPHONE BASE STATION

Notes: _____

Data File Name: 2355.dat

Page: 4 of 5

Measurement summary for limit2: EN55022 B Avg (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA2 EN55022 B Avg
1.85 MHz	40.85 Av	0.19 / 0.0 / 0.0 / 0.0	41.04	N	-4.96
2.18 MHz	40.68 Av	0.21 / 0.0 / 0.0 / 0.0	40.89	L1	-5.11
1.32 MHz	40.59 Av	0.16 / 0.0 / 0.0 / 0.0	40.75	L1	-5.25
792.84 kHz	39.73 Av	0.13 / 0.1 / 0.0 / 0.0	39.96	L1	-6.04
726.0 kHz	39.15 Av	0.13 / 0.1 / 0.0 / 0.0	39.38	L1	-6.62
334.0 kHz	39.57 Av	0.11 / 0.1 / 0.0 / 0.0	39.78	L1	-9.57
9.25 MHz	39.53 Av	0.39 / 0.14 / 0.0 / 0.0	40.06	N	-9.94
3.04 MHz	33.09 Av	0.23 / 0.0 / 0.0 / 0.0	33.32	L1	-12.68
12.09 MHz	36.45 Av	0.44 / 0.22 / 0.0 / 0.0	37.11	L1	-12.89
4.03 MHz	32.35 Av	0.27 / 0.0 / 0.0 / 0.0	32.62	L1	-13.38
7.99 MHz	30.18 Av	0.36 / 0.04 / 0.0 / 0.0	30.58	N	-19.42
200.0 kHz	32.53 Av	0.1 / 0.17 / 0.0 / 0.0	32.8	L1	-20.81
20.81 MHz	26.3 Av	0.58 / 0.36 / 0.0 / 0.0	27.25	L1	-22.75
270.0 kHz	24.18 Av	0.1 / 0.1 / 0.0 / 0.0	24.38	L1	-26.73
24.35 MHz	20.27 Av	0.62 / 0.65 / 0.0 / 0.0	21.54	L1	-28.46
150.0 kHz	16.79 Av	0.07 / 0.3 / 0.0 / 0.0	17.16	L1	-38.84

Tested by: J. T. Schneider

Printed

Signature

Reviewed by: Greg Jakubowski

Printed

Signature

CONDUCTED EMISSIONS



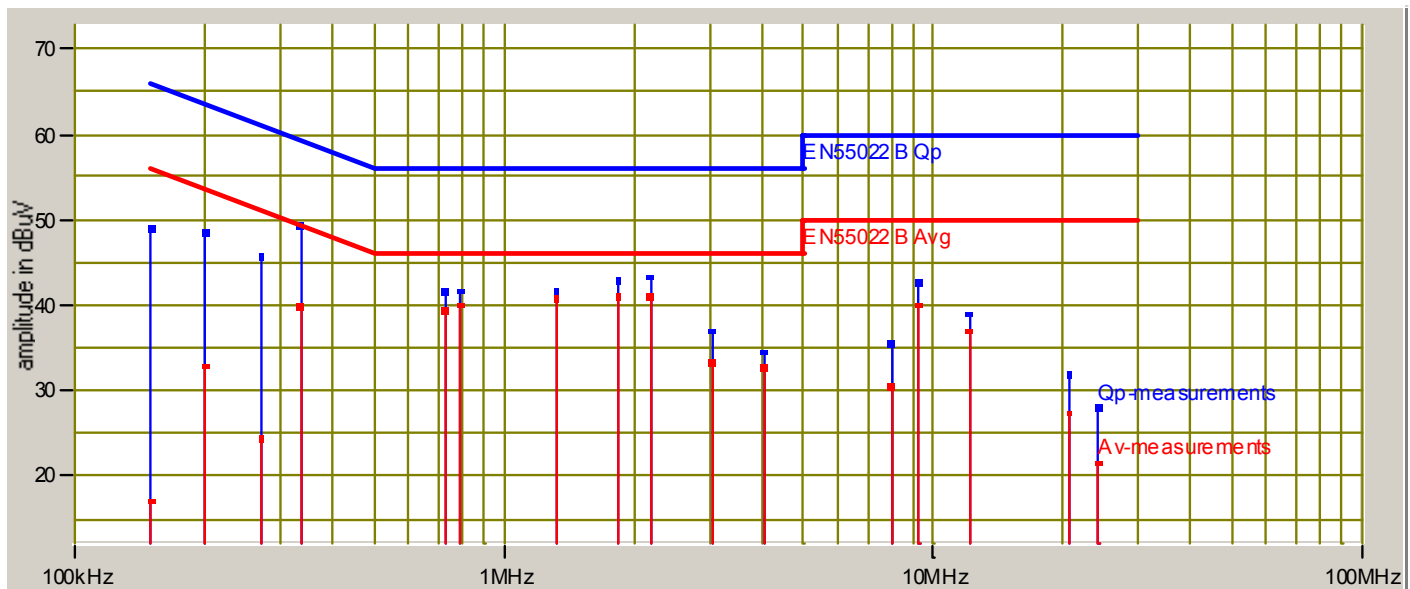
Test Report #: DI602355 Run 4 Test Area: SCREENROOM
EUT Model #: SOLO EXECUTIVE Date: 5/25/2006
EUT Serial #: _____ EUT Power: 60Hz/120VAC Temperature: 23.0 °C
Test Method: FCC 15 SUBPART D Air Pressure: 99.0 kPa
Customer: REVOLABS Rel. Humidity: 40.0 %
EUT Description: WIRELESS MICROPHONE BASE STATION

Notes: _____

Data File Name: 2355.dat

Page: 5 of 5

Graph:



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Joel T. Schneider

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Greg Jakubowski

Signature

General technical requirements

Digital modulation techniques: FCC 15.319(b), IC RSS-213 6.1

The DECT standard GFSK modulation is used.

Peak transmit power: FCC 15.319(c), IC RSS-213 6.5

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

The peak transmit power does not exceed 100 microwatts multiplied by the square root of the emission bandwidth in Hertz.

Test location

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☒ - Wild River Lab Shield Room – conducted measurement for base station

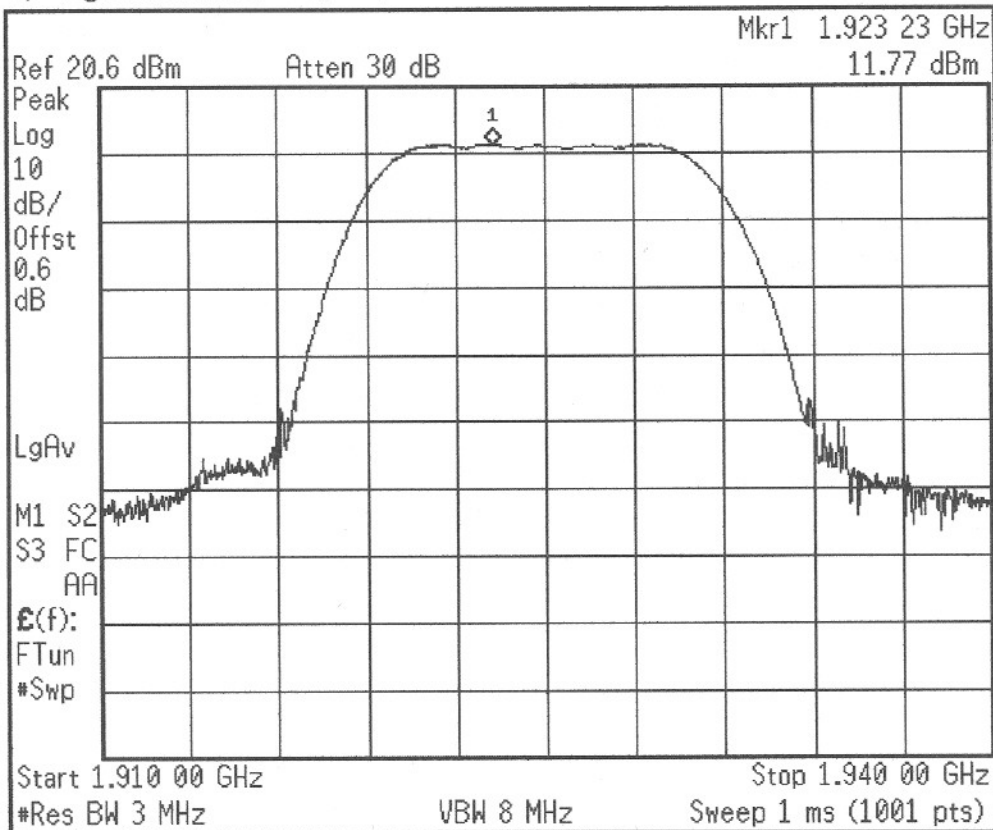
Test equipment (TUV)

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

Test limits

120 milliwatts, based on $100 \text{ microwatts} \times (1460000 \text{ Hz})^{1/2}$



Title
Change Title
Clear Title

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base- conducted measurement

$$11.77 \text{ dBm} = 15 \text{ mW}$$

$$\text{Limit} = 100 \mu\text{W} \times \sqrt{1.46 \times 10^6} = 120 \text{ mW}$$

All channels

Power spectral density: FCC 15.319(d), IC RSS-213 6.6

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Power spectral density does not exceed 3 milliwatts in any bandwidth of 3 kHz as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

Test location

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☒ - Wild River Lab Shield Room – conducted measurement for base station

Test Distance

- ☐ - 3 meters
- ☐ - 10 meters
- ☒ - Conducted measurement

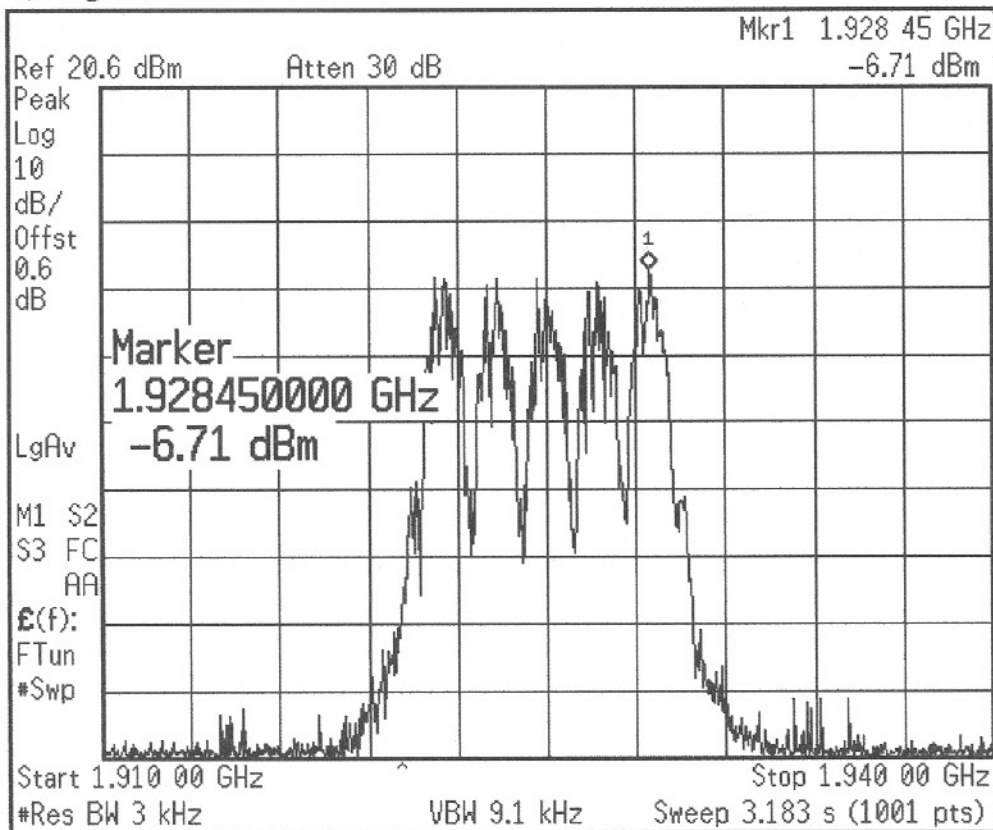
TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

Test limit

3 milliwatts in any bandwidth of 3 kHz

* Agilent 09:55:48 May 18, 2006



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

Mkr → CF

More
1 of 2

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power density limit = $3 \text{ mW} / 3 \text{ kHz}$

$-6.71 \text{ dBm} = 213 \mu\text{W} / 3 \text{ kHz}$

base unit

Emission bandwidth: FCC 15.323(a), IC RSS-213 6.4

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Operation is contained within the 1920-1930 MHz band. The emission bandwidth is less than 2.5 MHz. The power level is as specified in 15.319(c), but in no event is the emission bandwidth be less than 50 kHz.

Test location

☒ - Wild River Lab Shield Room – conducted measurement for base station

Test Distance

☐ - 3 meters

☐ - 10 meters

☒ - Conducted measurement

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

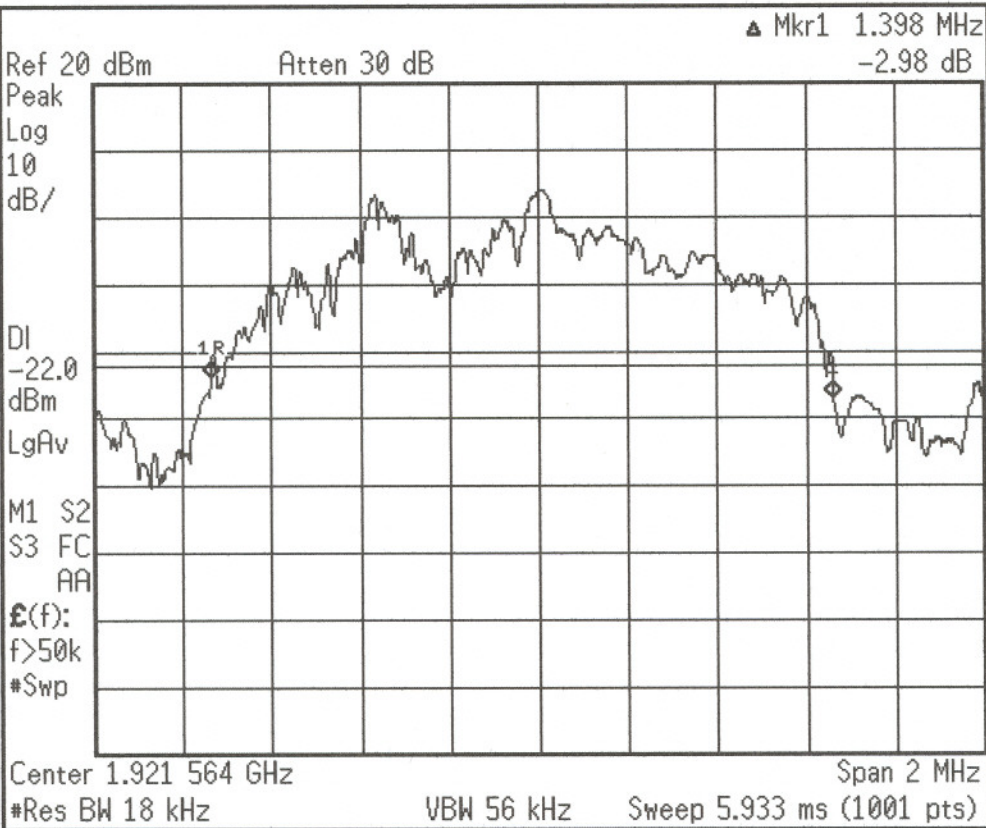
Test limit

Minimum 50 kHz, maximum 2.5 MHz

Test data

Maximum measured 1.46 MHz, minimum measured 1.368 MHz

* Agilent 08:51:32 ~~Jun 12, 1982~~ 18 MAY 2006



Title

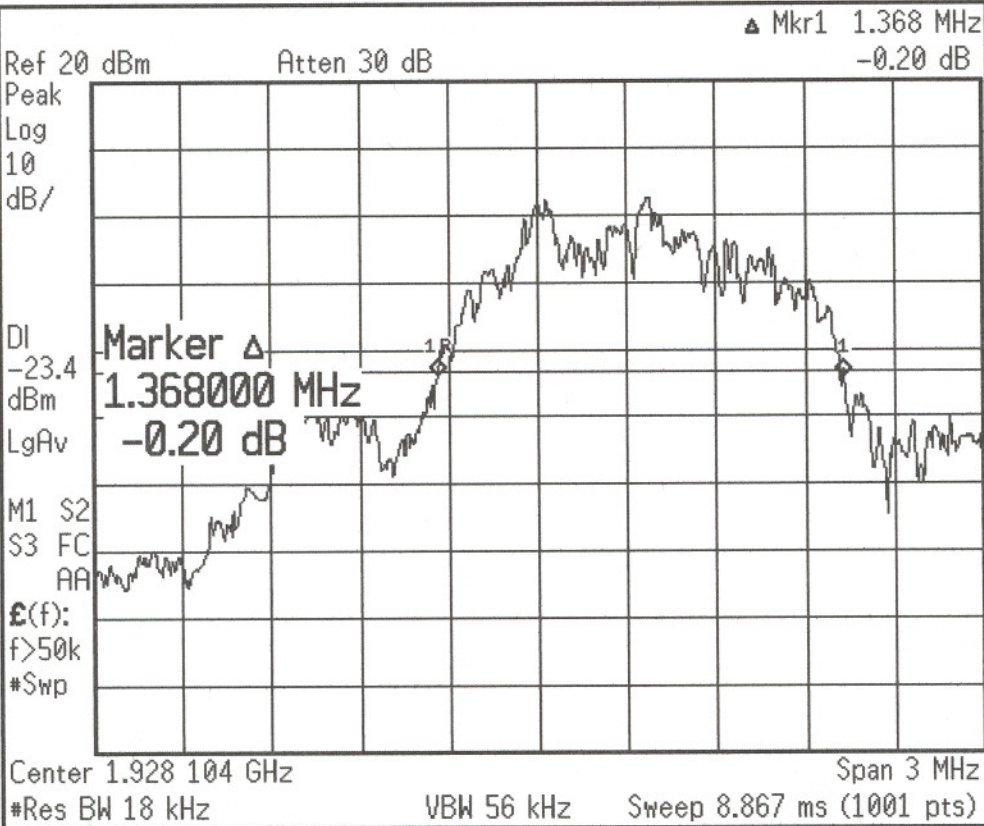
Change Title

Clear Title

base - port 1 - low channel

emission bw

* Agilent 06:57:24 Jun 12, 1982 18 MAY 2006

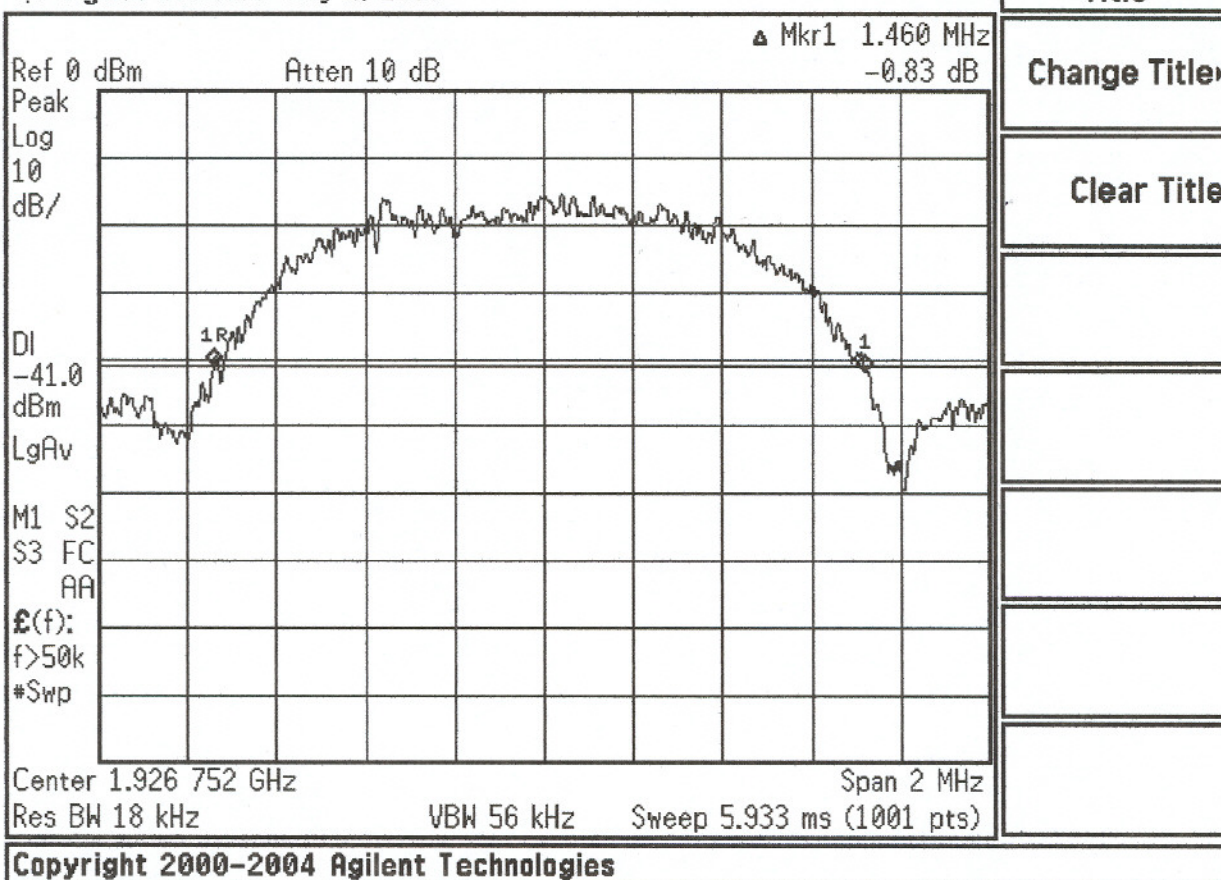


Marker			
Select Marker			
1	2	3	4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Ref	▲		
Span Pair			
Span	Center		
Off			
More 1 of 2			

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base - port 1 - high channel
emission bw

* Agilent 10:50:12 May 5, 2006



mike 101 - emission bw
 mike 110 - emission bw
 base port 1 - emission bw
 All channels tested - this is max.

Emissions outside and inside the sub-band: FCC 15.323(d), IC RSS-213 6.7.2, 6.7.1

Test summary

The requirements are: ■ - MET □ - NOT MET

Test Distance

- - 3 meters
- - 10 meters
- - Conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	31-Mar-07
2679	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00550	23-Nov-06
8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	28-Mar-07
8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	28-Mar-07
2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	02/17/2007-B
2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	9001-3275	08-Dec-06
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06
6717	3116	Electro-Mechanics (EMCO)	Ridge Guide Antenna	2005	19-Sep-06
3958	SL18B4020	Phase One Microwave	Preamplifier	0002	Code B

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

Test limits

Emissions outside the sub-band shall be attenuated below a reference power of 112 milliwatts as follows:
 30 dB between the sub-band and 1.25 MHz above or below the sub-band
 50 dB between 1.25 and 2.5 MHz above or below the sub-band
 60 dB between 2.5 MHz or greater above or below the sub-band

Emissions inside the sub-band must comply with the following emission mask:

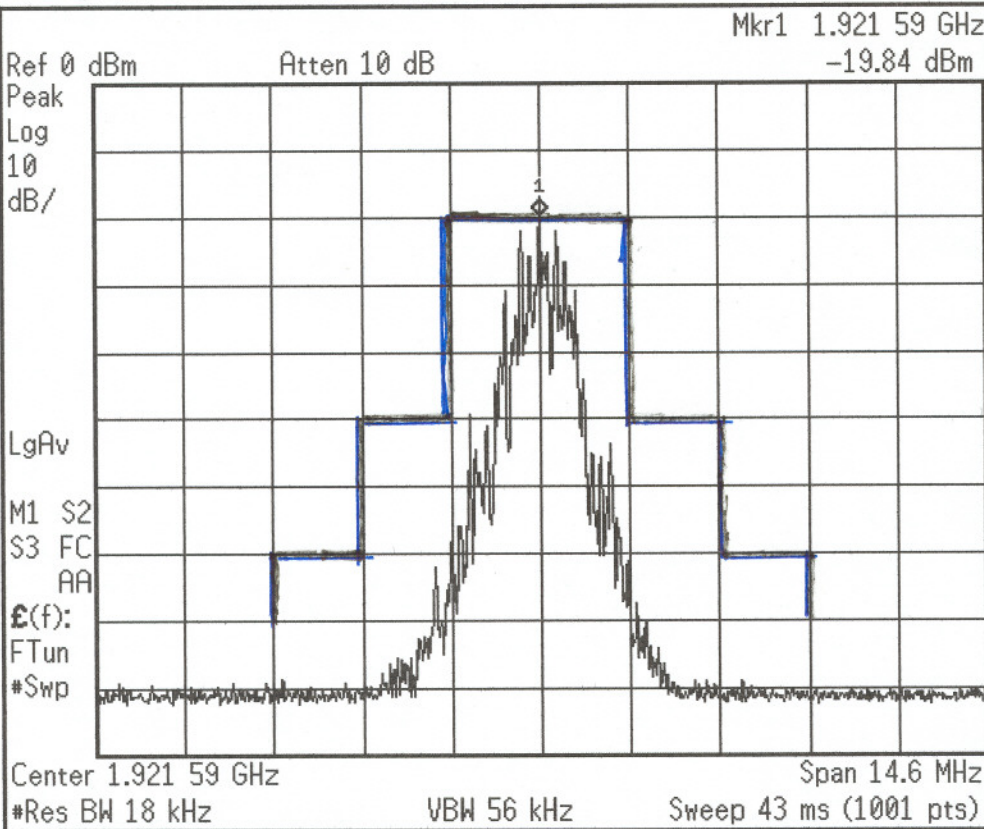
30 dB below 120 mW between 1B and 2B
 50 dB below 120 mW between 2B and 3B
 60 dB below 120 mW between 3B and sub-band edge

Test data

Plot demonstrates device meets inside sub-band mask for 15 mW, so also meets inside sub-band mask for 120 mW (9 dB higher). B = 1.46 MHz.

Plots demonstrate device meets outside sub-band, band edge limits are met by 60 dB below 112 mW level being reached inside sub-band.

Radiated emissions show outside sub-band requirements met by minimum of 1 dB at 3.846 GHz.



Display

Full Screen

Display Line

-73.50 dBm

On

Off

Limits

Active Fctn

Position

Center

Title

Preferences

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in-band mask - low channel

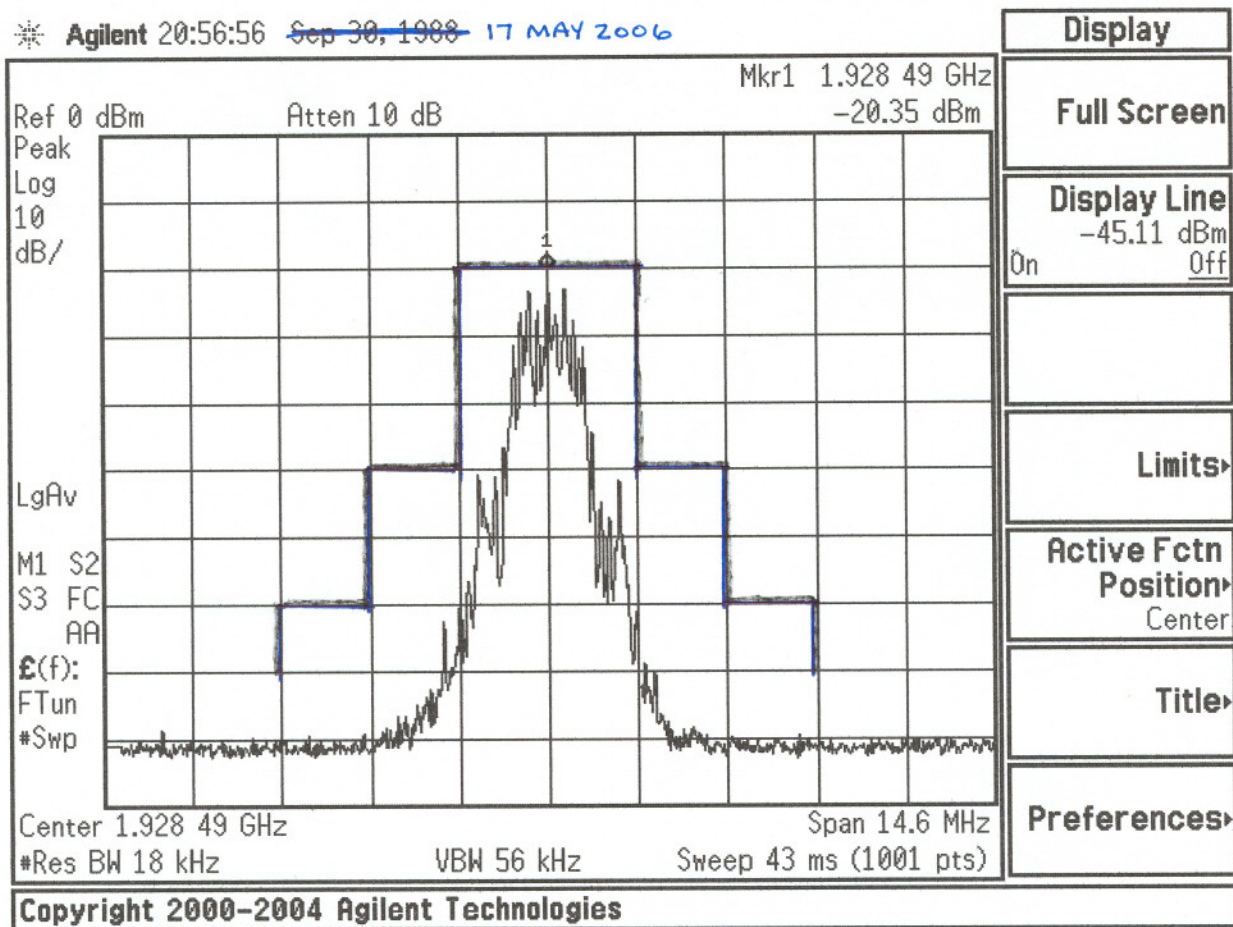
$$B = 1.46 \text{ MHz}$$

same for base + mic

mask drawn is for 15mW permitted xmit power

mask for 120mw transmit power would be

9 dB higher



in-band mask - high channel

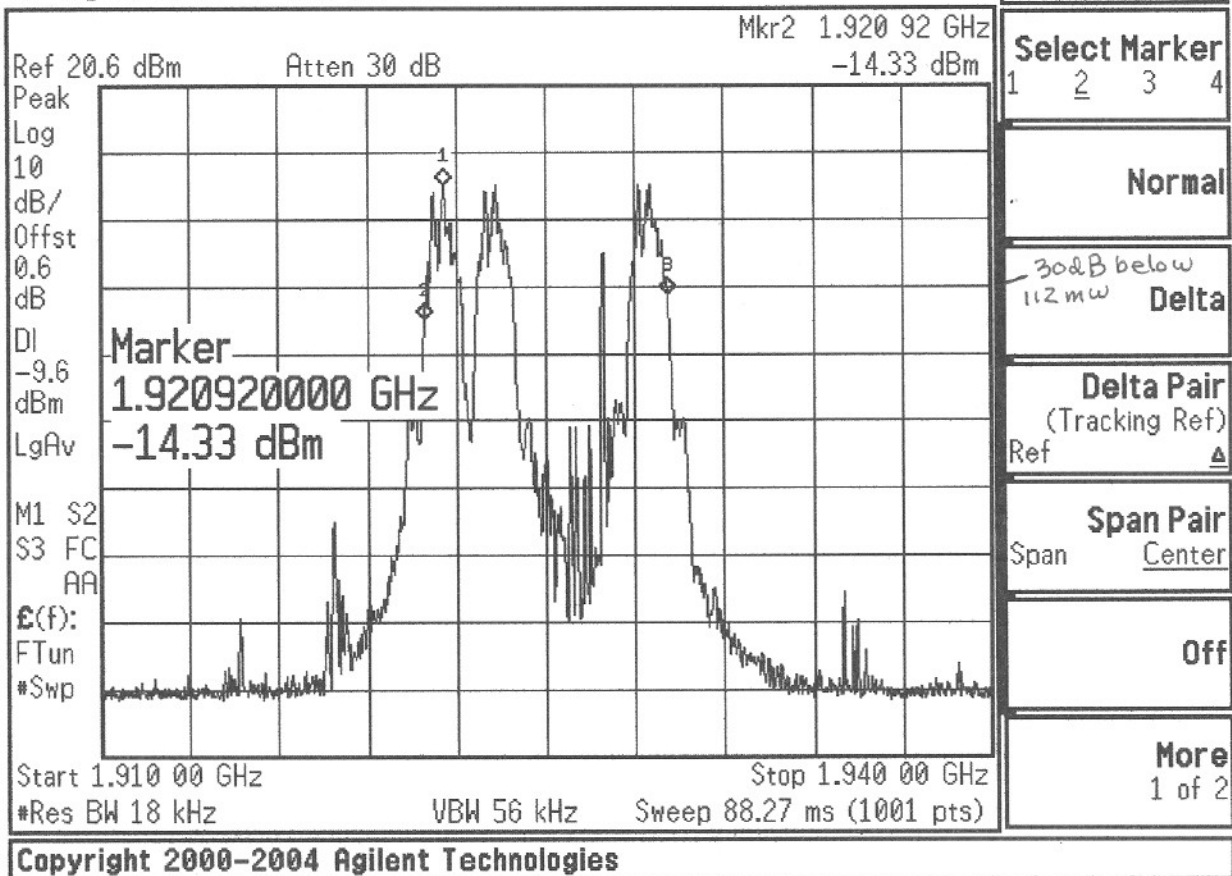
$$B = 1.46 \text{ MHz}$$

same for base + mic

mask drawn is for 15 mw permitted xmit power

mask for 120 mw transmit power would be

9 dB higher



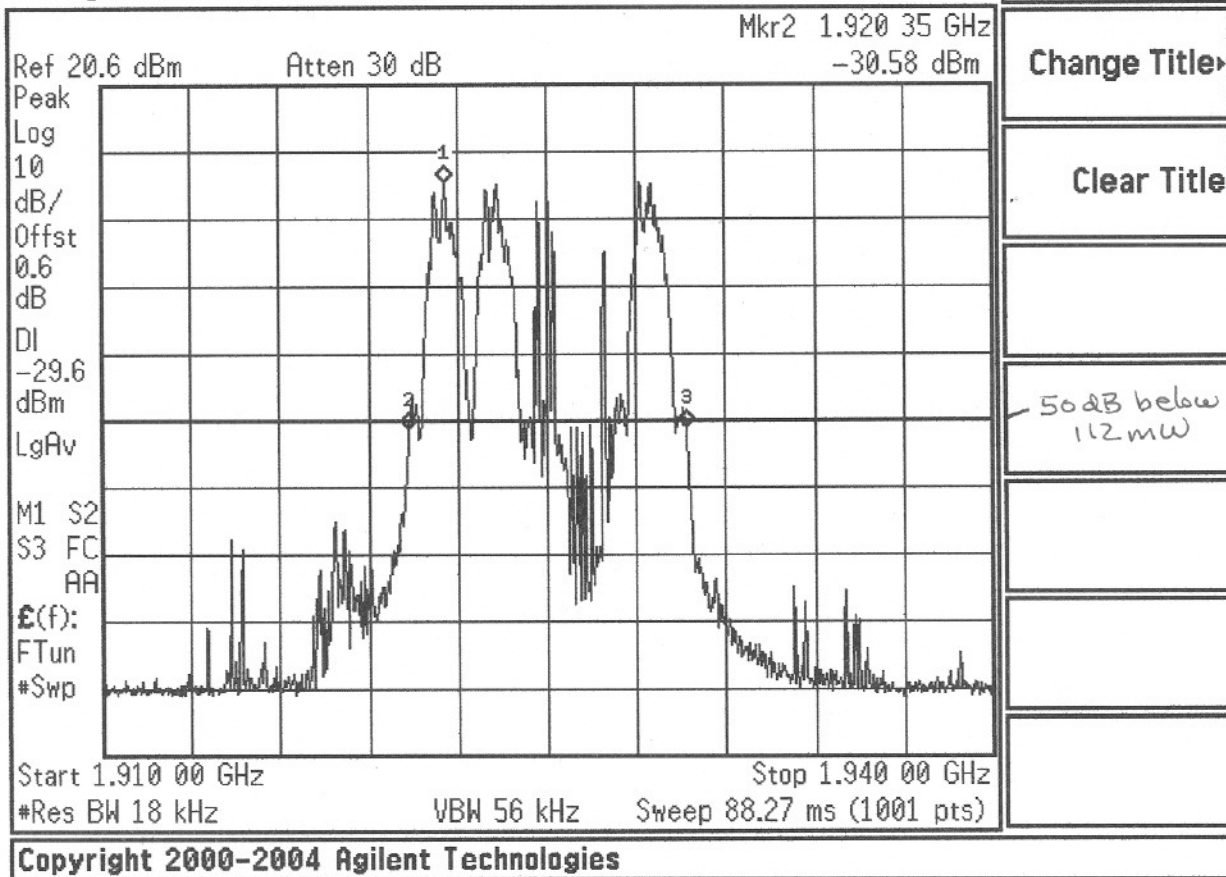
base

emissions outside sub-band

reaches 30dB below 112mw in sub-band

marker 2 = 1.92092 GHz

marker 3 = 1.92908 GHz



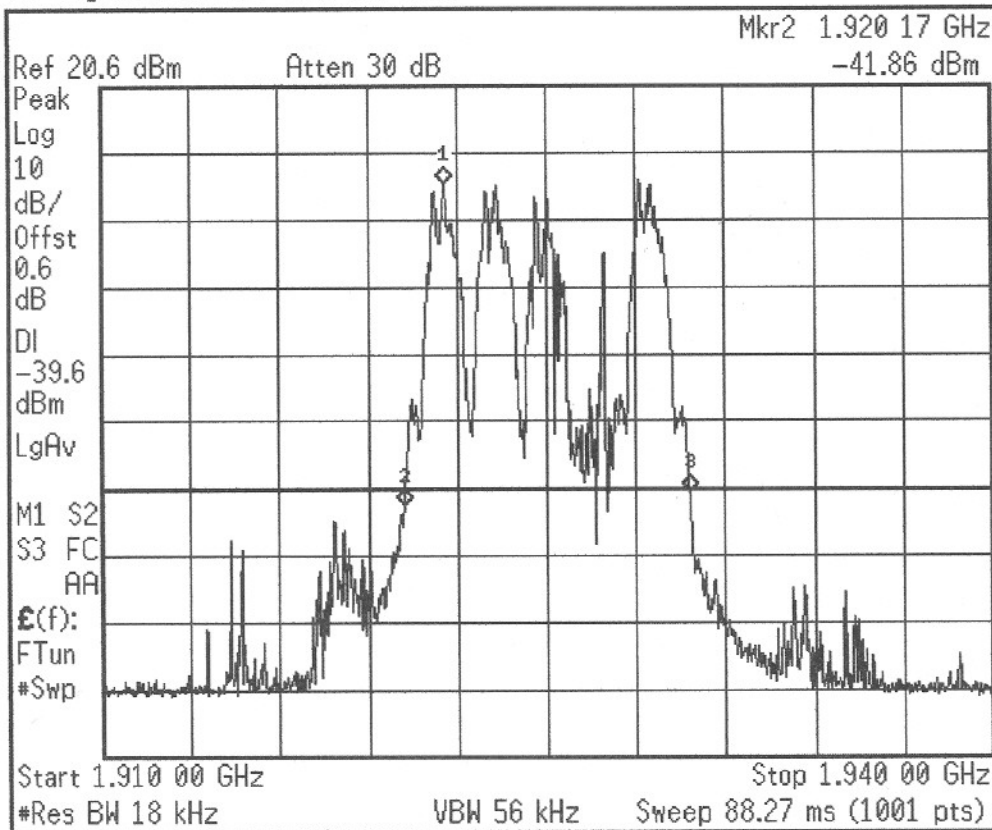
base

emissions outside sub-band

reaches 50dB below 112mW in sub-band

Marker 2 = 1.92035 GHz

Marker 3 = 1.92965 GHz



Title
Change Title
Clear Title
60 dB below 112 mW

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base
emissions outside sub-band
reaches 60 dB below 112 mW in sub-band
marker 2 = 1.92017 GHz
marker 3 = 1.92980 GHz

mm

RADIATED EMISSIONS



Test Report #: DI602355 Run 3 Test Area: LTS

EUT Model #: SOLO Date: 5/19/2006

EUT Serial #: _____ EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 96.0 kPa

Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE STATION

Notes: _____

Data File Name: 2355.dat

Page: 1 of 1

List of measurements for run #: 3

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	Part 15 Subpart D Limit – dBuV/m	DELTA2
RBW= 20 kHz – 57.9 dBuV/m = 60 dB below 112 mW						
259.37 MHz	42.6 Pk	1.35 / 11.69 / 27.8 / 0.0	27.83	V / 1.00 / 0	57.9	n/a
961 MHz maxed:						
961.68 MHz	29.9 Pk	2.59 / 22.83 / 0.0 / 0.0	55.32	V / 1.00 / 0	57.9	n/a
964.226 MHz	28.1 Pk	2.59 / 22.88 / 0.0 / 0.0	53.58	V / 1.00 / 0	57.9	n/a
964.21 MHz	20.55 Pk	2.59 / 22.88 / 0.0 / 0.0	46.03	H / 1.00 / 0	57.9	n/a
964.246 MHz	21.5 Pk	2.59 / 22.88 / 0.0 / 0.0	46.98	H / 3.60 / 0	57.9	n/a
2.882 GHz	21.25 Pk	4.77 / 29.68 / 0.0 / 0.0	55.7	V / 3.60 / 0	57.9	n/a
3.846 GHz	19.35 Pk	5.51 / 31.93 / 0.0 / 0.0	56.79	V / 3.60 / 0	57.9	n/a
4.807 GHz	37.15 Pk	6.17 / 32.5 / 45.24 / 0.56	31.14	V / 3.10 / 0	57.9	n/a
5.785 GHz maxed – transmitting on port 2						
5.785 GHz	50.8 Pk	7.19 / 33.79 / 45.9 / 0.82	46.7	V / 1.30 / 22	57.9	n/a
5.764 GHz	50.8 Pk	7.16 / 33.76 / 45.74 / 0.82	46.7	V / 1.30 / 22	57.9	n/a
6.736 GHz	32.65 Pk	7.75 / 35.04 / 45.55 / 0.75	30.64	V / 3.10 / 0	57.9	n/a
END OF MEASUREMENTS.						

Tested by: J. C. SAUEN

Printed

J C Sauen

Signature

Reviewed by: Greg Jakubowski

Printed

G Jakubowski

Signature

Frequency stability: FCC 15.323(f), IC RSS-213 6.2

Test summary

The requirements are: ■ - MET □ - NOT MET

Degrees C	Frequency (MHz) – Channel 1	Frequency (MHz) – Channel 5
-20	1921.558 (+4 ppm)	1928.492 (+4 ppm)
-10	1921.550 (0 ppm)	1928.483 (0 ppm)
0	1921.558 (+4 ppm)	1928.500 (+8 ppm)
10	1921.550 (0 ppm)	1928.500 (+8 ppm)
20	1921.550	1928.483
30	1921.567 (+8 ppm)	1928.492 (+4 ppm)
40	1921.550 (0 ppm)	1928.467 (-8 ppm)
50	1921.550 (0 ppm)	1928.467 (-8 ppm)
VAC		
102	1921.560 (+5 ppm)	1928.480 (-1 ppm)
138	1921.568 (+9 ppm)	1928.480 (-1 ppm)

Environtronics SH27, s/n 09963482-S

Agilent E4440A spectrum analyzer, #3367, cal due 02 September 2006.

Staco variac, #3846

Fluke 77 voltmeter, #2103, cal due 30 March 2007

Worst case of microphone/base station over 15 minute period are recorded, voltage measurements only apply to base station.

Test limits

±10 ppm

Appendix A

Constructional Data Form





EMC Test Plan and Constructional Data Form

America

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company: Revolabs, Incorporated
 Address: 63 Great Road
Maynard, MA 01754
 Contact: Edward Chu Position: Senior Program Manager
 Phone: 978.897.5655 x113 Fax: 978.897.5616
 E-mail Address: echu@revolabs.com

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description Wireless Microphone Base Station & Wireless Microphone
 EUT Name Solo Executive Base Station & Solo Executive Microphones
 Model No.: 01-EXERAC-BLK-11 Serial No.: 501050000001
& 01-EXEMIC-BLK-11 & 501050000003
 Product Options: _____
 Configurations to be tested: _____

Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)

Modifications since last test: _____
 Modifications made during test: _____

Test Objective(s): Please indicate the tests to be performed, entering the applicable standard(s) where noted.

- | | |
|---|--|
| ☐ EMC Directive 89/336/EEC (EMC)
Std: _____ | ☒ FCC: Class ☐ A ☒ B Part <u>15</u> |
| ☐ Machinery Directive 89/392/EEC (EMC)
Std: _____ | ☐ VCCI: Class ☐ A ☐ B |
| ☐ Medical Device Directive 93/42/EEC (EMC)
Std: _____ | ☐ BSMI: Class ☐ A ☐ B |
| ☐ Vehicle Directive 72/245/EEC (EMC)
Std: _____ | ☒ Canada: Class ☐ A ☒ B |
| ☐ FDA Reviewers Guidance for Premarket
Notification Submissions (EMC) | ☐ Australia: Class ☐ A ☐ B |
| | ☐ Other: _____ |

Third Party Certification, if applicable (*Signature on Page 6 Required)

- | | |
|--|---|
| ☐ Attestation of Conformity (AoC)* | ☐ EMC Certification (used with Octagon Mark)* |
| ☐ Certificate of Conformity (CoC)*
Protection Class (N/A for vehicles) | ☐ Compliance Document* |
| (Press F1 when field is selected to show additional information on Protection Class.) | ☐ Class I ☐ Class II ☐ Class III |
| ☒ FCC / TCB Certification | ☒ Industry Canada / FCB Certification |
| ☐ E-Mark Certification | ☐ Taiwan Certification |

**EMC Test Plan and Constructional Data Form****Attendance**Test will be: ☐ Attended by the customer ☒ Unattended by the customer**Failure - Complete this section if testing will not be attended by the customer.**

If a failure occurs, TÜV America should:

- ☐ Call contact listed above, if not available then stop testing. (After hrs phone): 508.494.4439
- ☒ Continue testing to complete test series.
- ☐ Continue testing to define corrective action.
- ☐ Stop testing.

EUT Specifications and RequirementsLength: 16.9" Width: 8.0" Height: 1.7" Weight: 6.5 lbs.**Power Requirements**

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 110 (If battery powered, make sure battery life is sufficient to complete testing.)# of Phases: 1Current (Amps/phase(max)): 1 Current (Amps/phase(nominal)): .09Other Charger Base 110 V, 0.3A AC, 5V 2A DC (max)**Other Special Requirements****Typical Installation and/or Operating Environment**(ie. Hospital, Small Business, Industrial/Factory, etc.)
Business conference room.**EUT Power Cable**

☐ Permanent OR ☒ Removable Length (in meters): 1.8

☐ Shielded OR ☒ Unshielded

☐ Not Applicable



EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables														
Type	Analog	Digital	During Test		Qty	Shielding		Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent	
			Active	Passive		Yes	No							Type
EXAMPLE:														
RS232	☐	☒	☒	☐	2	☒	☐	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	☒	☐
Audio line-level in/out	☒	☐	☒	☐	16	☒	☐	2 condutor audio with shield	bare wire	3.5mm mini-phoenix	none	1	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐



EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: c7490_r4

Description: Operating software

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Base Station and eight microphones, all connected over air.
2. Base Station powered on but no connections. Eight microphones docked in charger, and synchronized to Base (i.e. listening within radio range)
- 3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #
Solo Executive Base Station (1)	01-EXERAC-BLK-11	501050000001	0014898290
Solo Executive Charger Base (1) includes PSU	01-EXECHG-STD-11	501050000002	0014898290
Solo Executive Microphone (8)	01-EXEMIC-BLK-11	501050000003 - 10	0014898290



EMC Test Plan and Constructional Data Form

America

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)
This information is required for FCC & Taiwan testing.

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>
None - EUT is standalone.			

Oscillator Frequencies

<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
10.368MHz		4 Crystal on Base Station	processor clock and radio sythesizer reference
10.368Mhz		1 Crystal on microphone	processor clock and radio sythesizer reference
315MHz		1 SAW resonator on Charger Base	315MHz transmitter module
315MHz		1 SAW receiver on Base Station	315MHz receiver module

Power Supply

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
Phihong	PSC10A-050S		☒ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
XP Power	ACS20US05		☒ Switched-mode: (Frequency) <u>50-70 kHz</u> ☐ Linear ☐ Other: _____

Power Line Filters

<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>



EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)

<i>Description</i>	<i>Manufacturer</i>	<i>Part # or Value</i>	<i>Qty</i>	<i>Component # / Location</i>
No major components.				
Many small ceramic bypass capacitors.				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

Multilayer PCBs with ground planes and careful layout.
 Series resistance on most external connections.
 BPF and LPF on RF connections.

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures (Signature Required for Certifications checked on pg 1)

Marty Bodley, CEO

June 21, 2006

Customer authorization to perform tests
 according to this test plan.

Date

Tom Zimmerman

June 21, 2006

Test Plan/CDF Prepared By (please print)

Date

Appendix B

Measurement Protocol



MEASUREMENT PROTOCOL

Environmental conditions in the lab, (TUV)

Temperature: 22 - 26° C

Relative Humidity: 20 - 22 %

Atmospheric pressure: 98.0 – 99.0 kPa

Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of ± 1.8 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of ± 4.8 dB. The equipment comprising the test systems is calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

Radiated Emissions

The final level, in dB μ V/m, equals the reading from the spectrum analyzer (Level dB μ V), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dB μ V/m)	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

Substitution Method

Radiated emissions from the EUT are measured in the frequency range of 30 to 19500 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are positioned through 3 orthogonal axes to determine the maximum level. The field strength levels were measured per ANSI C63.4. The EUT is then replaced with a tuned dipole antenna (below 1 GHz) or horn antenna (above 1 GHz). The substitute antenna was placed in the same polarization as the test antenna. A signal generator was used to generate a signal level that matched the highest level measured from the EUT. The signal generator level minus the cable loss from the signal generator to the substitute antenna plus the substitute antenna gain equals the power level.

Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.